



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/717,257

11/18/2003

Phuc Van

7701

7590

12/30/2004

Ann Koo
1631 North First Street
San Jose, CA 95112-4516

EXAMINER

TANG, MINH NHUT

ART UNIT

PAPER NUMBER

2829

DATE MAILED: 12/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/717,257

Applicant(s)

VAN ET AL.

Examiner

Minh N. Tang

Art Unit

2829

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 2 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 November 2003.
- 2a) ☐ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☒ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) _____ is/are rejected.
- 7) ☒ Claim(s) 1-17 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 November 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION***Drawings***

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: reference numbers 3, 4, and 5 in Figs. 1, 1A and 1B. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "15" in Fig. 1B has been used to designate both CCD camera and a connection between lock-in amp. 13 and SPV probe 11. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be

Art Unit: 2829

labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. The disclosure is objected to because of the following informalities:

a/ on page 3, line 3, "5.025,145" should be -- 5,025,145 --.

b/ on page 6, line 22, "1a" should be -- 1A --.

c/ on page 7, line 4, "1b" should be -- 1B --.

d/ on page 8, "trough" (line 11), and "look-in" (line 17) should be -- through --, and -- lock-in --, respectively.

e/ on page 9, line 8, "Fig.3, 4" should be -- Figs. 3 and 4 --.

f/ on page 10, "optical fiber 17" (line 16), and "look-in" (line 17) should be -- optical fiber 7 --, and -- lock-in --, respectively.

g/ on page 11, line 13, "look-in" should be -- lock-in --.

Appropriate correction is required.

4. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

5. Claims 1-17 are objected to because of the following informalities:

a/ in claim 1, "a transparent element placed on surface of the transparent element" (lines 5-6), "a said transparent element" (line 7), "computer" (line 11), "photo

Art Unit: 2829

detector" (line 13), "said measuring system" (line 15), "to said pre-amplifier input, said pre-amplifier output connected to said lock-in amplifier input and said lock-amplifier output connected to computer" (lines 16-18), "pre-amplifier input and said pre-amplifier output connected to computer" (lines 20-21), "to computer" (line 25), "probe electrode" (lines 26-27), and "said stages controlled by computer" (lines 29-30) should be -- a transparent element placed on surface of the electrode --, -- said transparent element --, -- a computer --, -- a photo detector --, -- said means for measuring --, -- to the input of said SPV pre-amplifier, the output of said SPV pre-amplifier connected to the input of said lock-in amplifier and the output of said lock-in amplifier connected to said computer --, -- the input of said pre-amplifier and the output of said pre-amplifier connected to said computer --, -- to said computer --, -- electrode --, and -- said linear stages and said rotary stage controlled by said computer --, respectively.

b/ in claims 2-11, all in line 1, "An apparatus" should be -- The apparatus --.

c/ in claim 2, "the transparent element of the probe electrode" (lines 1-2), "the transparent glass" (line 2), "said transparent being disk" (lines 3-4), "the metal ring" (line 4), and "the central region" (line 5) should be -- the transparent element --, -- a transparent glass --, -- said transparent disk being --, -- a metal ring --, and -- a central region --, respectively.

d/ in claim 4, line 2, "the optical combiners" should be -- an optical combiners --.

e/ in claim 5, "a transparent substrate" (line 2), and "the optical collimator" (line 3) should be -- said electrode --, and -- an optical collimator --, respectively.

Art Unit: 2829

f/ in claim 6, "radiation" (line 3), "said probe" (line 5), "an electrode" (lines 5-6), "transparent element" (line 6), "a non-transparent element" (lines 6-7), "said transparent" (line 7), "said radiation" (lines 7-8), "said non-transparent" (line 8), "said transparent element" (lines 8-9), "said electrode" (line 9), "computer" (line 13), "said transparent element" (line 14), "said electrode of the probe and photo detector" (line 15), "said electrode" (line 17), "a pre-amplifier" (line 17), "a lock-in amplifier" (line 17), "said electrode connected to said pre-amplifier input, said pre-amplifier output connected to said lock-in amplifier input and said lock-amplifier output connected to a computer" (lines 18-20), and "pre-amplifier with said photo detector connected to pre-amplifier input and said pre-amplifier output connected to computer" (lines 21-23) should be -- a second radiation --, -- said second probe --, -- a second electrode --, -- a second transparent element --, -- a second non-transparent element --, -- said second transparent --, -- said second radiation --, -- said second non-transparent --, -- said second transparent element --, -- said second electrode --, -- said computer --, -- said second transparent element --, -- said second electrode of the second probe and a second photo detector --, -- said second electrode --, -- a second pre-amplifier --, -- a second lock-in amplifier --, -- said second electrode connected to the input of said second pre-amplifier, the output of said second pre-amplifier connected to the input of said second lock-in amplifier and the output of said second lock-in amplifier connected to said computer --, and -- a third pre-amplifier with said second photo detector connected to the input of said third pre-amplifier and the output of said third pre-amplifier connected to said computer --, respectively.

Art Unit: 2829

g/ in claim 7, "the transparent element" (line 1), "the probe" (line 1), "a transparent glass" (lines 1-2), "said transparent disk" (line 2), "said transparent disk" (line 3), and "a metal ring" (line 4) should be -- the second transparent element --, -- the second probe --, -- a second transparent glass --, -- said second transparent disk --, -- said second transparent disk --, and -- a second metal ring --, respectively.

h/ in claim 8, "said transparent disk" (line 1), and "outer diameter of the metal ring" (line 2) should be -- said second transparent disk --, and -- the outer diameter of the second metal ring --, respectively.

i/ in claim 9, line 2, "a wafer surface" should be -- the wafer surface --.

j/ in claim 10, "a second transparent element" (line 2), "the probe" (line 2), "said SPV probe" (line 4), "said probe electrode" (line 5), and "said photo detector" (line 6) should be -- said second transparent element --, -- the second probe --, -- said second probe --, -- said second electrode --, and -- said second photo detector --, respectively.

k/ in claim 12, "the wafer" (line 1), "the illumination area" (line 4), "back side" (line 4), and "back side" (line 6) should be -- a wafer --, -- an illumination area --, -- a back side --, and -- the back side --, respectively.

l/ in claims 13-17, all in line 1, "A method" should be -- The method --.

Appropriate correction is required.

Conclusion

6. This application is in condition for allowance except for the following formal matters: the objections to the drawings, the specification and the claims as set forth above.

Art Unit: 2829

Prosecution on the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

A shortened statutory period for reply to this action is set to expire **TWO MONTHS** from the mailing date of this letter.

7. The following is a statement of reasons for the indication of allowable subject matter:

Claims 1-11 recite, inter alia, an apparatus for determining the diffusion length of semiconductor wafers comprising means for measuring surface photovoltage (SPV) signals picked up by said electrode, said means for measuring including SPV pre-amplifier and lock-in amplifier with said electrode connected to the input of said SPV pre-amplifier, the output of said SPV pre-amplifier connected to the input of said lock-in amplifier and the output of said lock-in amplifier connected to said computer.

Claims 12-17 recite, inter alia, a method for determining diffusion length in predetermined regions of a wafer comprising illuminating said area on the back side wafer surface with frequency modulated light with predetermined intensities at a series of wavelengths, λ_i , measuring light fluxes Φ_i directed onto said illumination area and measuring photovoltages V_i from said illuminating area, illuminating said area at different intensities at the same wavelength λ_i , measuring light fluxes Φ_i and Φ_{II} and corresponding surface photovoltages V_i , and determining the diffusion length using values V_i' , Φ_i and intercept of the plot Φ_i/V_i' versus light penetration depth.

The art of record does not disclose the above limitations, nor would it be obvious to modify the art of record so as to include the above limitations.

Art Unit: 2829

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Lagowski et al.	6,512,384	Method For Fast And Accurate Determination Of The Minority Carrier Diffusion Length From Simultaneously Measured Surface Photovoltages.
Lagowski et al.	5,663,657	Determining Long Minority Carrier Diffusion Lengths.
Lagowski	5,025,145	Method And Apparatus For Determining The Minority Carrier Diffusion Length From Linear Constant Photon Flux Photovoltage Measurements.
Goodman	4,333,051	Method And Apparatus For Determining Minority Carrier Diffusion Length In Semiconductors.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Minh N. Tang whose telephone number is (571) 272-1971. The examiner can normally be reached on M-F (7:00-3:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nestor R. Ramirez can be reached on (571) 272-2034. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2829

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



MINH NHUT TANG
PRIMARY EXAMINER

12/22/04